AD-A193 567 HIERACHICAL STRUCTURE IN POLYMERIC SOLIDS AND ITS INFLUENCE ON PROPERTIES(U) BRISTOL UNIV (ENGLAND) A KELLER MAY 85 R/D-4794-MS-01 DAJA45-85-C-0004 1/1

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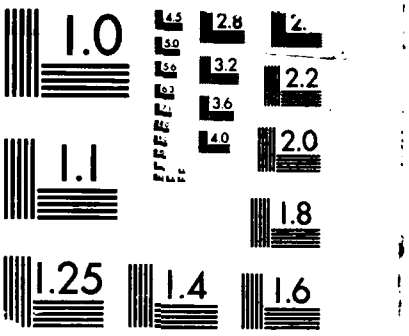

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HIERARCHICAL STRUCTURE IN POLYMERIC SOLIDS AND ITS INFLUENCE ON PROPERTIES

Investigator: A. Keller

Contractor: Department of the U.S. Army, ERO

Contract Number: DAJA45-85-C-0004

1st Periodic Report

March 1985 - May 1985

The Research reported in this document has been made possible through the support and sponsorship of the U.S. Government through its European Research Office of the U.S. Army. This report is intended only for the internal management use of the Contractor and the U.S. Government.

Scope of Report

This Report will account for some of the preparations prior to the commencement of the actual research to be started when the first staff to be engaged will be in position.

Period of Report in Relation to Project

The grant was awarded December 1984. The first Staff Member engaged will take up position June 1st, 1985, when research will start. The funds awarded were first activated in aid of preparations is March 1985. Hence the starting date of period to be reported is taken as March 1, 1985.

Report on Staff Appointments made

In accordance with the approved programme two staff appointments were made. Strong, high quality staffing has been my first priority. I am pleased to report that in spite of prevailing recruitment difficulties I succeeded in securing the services of two extremely well qualified postdoctorals of international status.

1) Dr. G. Ungar, who has performed outstanding postdoctoral research in our laboratory during past years. He will start June 1st 1985, the earliest date he can be released from existing commitments.

2) Dr. T. Owen, presently holding a Staff Appointment at Regensburg University, West Germany, desirous to return to his U.K. homeland. He will start October 1st, 1985, the earliest he can relinquish his present appointment and relocate his family.

A comment on appointment policy

Originally I proposed the appointment of 1 senior and 1 junior postdoctoral for 3 years each. Presently I appointed 2 seniors. This I did because of the exceptionally favourable appointment opportunities presenting themselves. From the present grant I can comfortably support 1 senior for 3 and the second for 2 years. Dr. Owen accepted the situation that without supplementation forthcoming his appointment will terminate after 2 years. From my part,by my judgement,I consider even this eventually in the best foreseeable interest of the project.

Actions taken during the present preparatory period

1) I paid a visit to the United States, March 4-21 to discuss planning of the project with our Cleveland associates and to establish further contacts. Transatlantic fares only being claimed.

2) Attendance of the Faraday Discussion on Liquid Crystal Polymers, Cambridge U.K., April 1-3 by myself and Dr. Ungar (the candidate to start on the programme in June). Attendance and local expenses being claimed.

3) Selecting, ordering and purchasing equipment for assembling apparatus needed for the programme. Cost of items which have arrived to date are being claimed.

Results of Actions taken

The visit to the U.S.A. (1 above) and participation at the Cambridge Conference were both exceptionally productive and essential preliminaries.

1) The visit to Cleveland. Two objectives were achieved; the first was as hopefully anticipated, the second

an unforeseen and fortunate confluence of circumstances.

The first objective was planning and coordinating of our mutual programmes with Professors Baer and Hiltner, also on U.S. Army support along their home channels. As originally proposed, our plans on rigid molecule liquid crystal forming polymers, including some biomolecular structure hierarchies were laid out, our respective parts delineated and lines of realistic mutual cooperation identified. Accordingly the Bristol effort will concentrate on: a) the influence of flow on liquid crystal formation and on the associated rheology with subsequent attack on the resulting structures,
b) crystallization from the liquid crystalline state with the study of the morphology and structure hierarchy. In addition, Bristol cooperation was offered to Cleveland with X-ray diffraction work for their biotexture studies. Selection of the most suitable starting materials was identified as the most important issue.

The fortunate circumstance referred to above arose in the last mentioned context which eventually led to a firming up of the Bristol start. Namely, Professor V. Percek at Cleveland is in the process of synthesizing a new family of polymers containing both rigid and flexible portions of the kind which have not been in existence before and which would be particularly suitable for the Bristol programme. They are currently being tailor-made to our requirements, with the first consignment expected to arrive by June when the actual Bristol work is to start. The materials are to comprise both lyotropic and thermotropic variaties including polymers such as are capable of forming liquid crystals through main chains and side chains. Acquisition of these polymers together with a hopefully continuing feed-back between the results of our investigations and continuing synthesis of new compounds promises to place us in a highly favourable position in this whole field.

2) The Cambridge Faraday Discussion

This proved to be the most up to date and comprehensive one on the broader subject area. Its attendance has familiarised us with the last minute start of the art. The acquisition of the preprinted papers and participation in their discussion ensured that we are in possession of all documentation required for an incisive start of the work and also saves us from the risk of unnecessary duplication.

Future Plans

As laid out in the main body of the report as a result of actions taken during the present preparatory period preceding the commencement of the research work itself.

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